User Guide

Fiber Optic Extenders

PowerCage FOX Tx/Rx HDMI

High Resolution Fiber Optic Transmitters and Receivers

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-1994-01 Rev. A
06 12

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:
This device may not cause harmful interference.

1. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, **click here**.

Conventions Used in this Guide

Notifications

DANGER: A danger indicates a situation that will result in death or severe injury.

WARNING: A warning indicates a situation that has the potential to result in death or severe injury.

CAUTION: A caution indicates a situation that may result in minor injury.

ATTENTION: Attention indicates a situation that may damage or destroy the product or associated equipment.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

Software Commands

Commands are written in the fonts shown here:

```
^ARMerge Scene,,Op1 scene 1,1^B51^W^C
```

```
[Ø1]RØØØ4ØØ3ØØØØ4ØØØØ8ØØØØ6ØØ[Ø2]35[17][Ø3]
```

Esc X1 * X17 * X20 * X23 * X21 CE ←

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 2Ø8.132.18Ø.48: bytes=32 times=2ms TTL=32
```

```
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
```

```
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

Contents

Introduction

WARNING: The PowerCage™ Tx/Rx HDMI units output continuous invisible light, which may be harmful to the eyes; use with caution.

- ***Do not look*** into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber cable is unplugged.

About this Guide

This guide contains information about the Extron® PowerCage FOX Tx HDMI transmitter and PowerCage FOX Rx HDMI receiver. These units are modular board-designed fiber optic transmitters and receivers for the PowerCage Modular Power Enclosures.

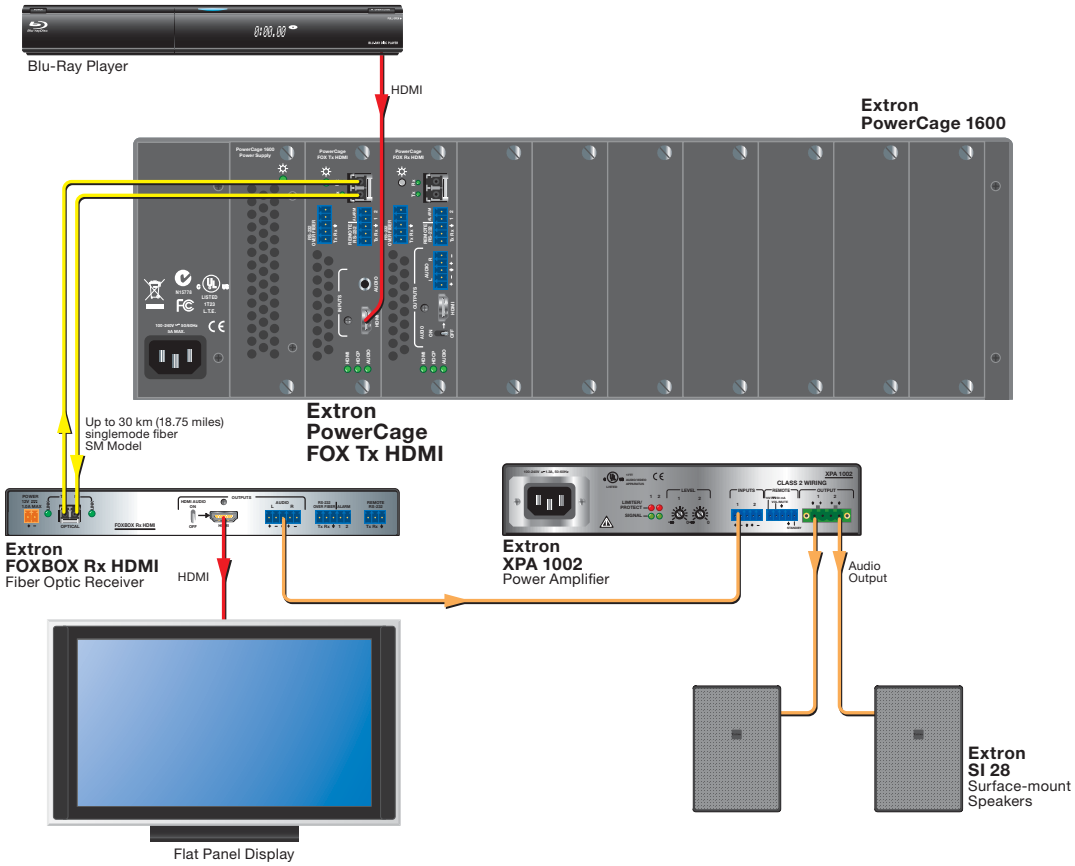


Figure 1. Typical PowerCage FOX Tx/Rx HDMI Application

This guide includes instructions for an experienced installer to install, configure, and operate the equipment.

About the PowerCage FOX HDMI Transmitters and Receivers

The PowerCage FOX HDMI Fiber Optic Extender is an ultra-high performance fiber optic transmitter and receiver set for long haul transmission of HDCP-compliant HDMI video, audio, and RS-232 control signals over fiber optic cabling. The transmitter and receiver can extend HDMI signals up to 30 km (18 miles).

NOTE: For HDCP compliance:

- A PowerCage FOX HDMI or FOXBOX HDMI transmitter must be paired with a PowerCage FOX HDMI or FOXBOX HDMI receiver.
- You must connect both fiber optic cables between the transmitter and receiver.
- A signal **cannot** be daisy-chained and retain HDCP compliance.
- The bidirectional Consumer Electronics Control (CEC) is **not** supported.

Transmitter

The PowerCage FOX Tx HDMI transmitter accepts HDMI video or DVI-D video (with an applicable adapter), at resolutions up to 1920 x 1200 at 60 Hz. The video input can also include embedded audio.

The transmitter can also accept an analog audio input on a 3.5 mm mini jack. An internal DIP switch selects either the embedded audio or the separate analog audio for the unit to transmit to the receiver.

The transmitter accepts a one-way (transmitter-to-receiver) RS-232 serial communication signal input (projector control, for example). The transmitter can receive an optional return (receiver-to-transmitter) stream of serial RS-232 communications (projector responses, for example).

The transmitter converts the HDMI video, the selected audio, and the RS-232 serial communication into a proprietary data stream and outputs it as an optical signal on a single LC connector to a compatible fiber optic receiver. It also can receive a proprietary optical signal from the receiver consisting of the RS-232 return from a controlled device.

Receiver

The PowerCage FOX Rx HDMI receiver accepts a proprietary optical signal on a single LC connector from a compatible fiber optic transmitter or daisy-chained receiver and outputs a single link of HDMI video, digital audio (embedded in the HDMI output), analog audio, and RS-232 serial commands.

If the receiver is appropriately configured and has a second fiber optic cable installed, it also can either:

- Receive an RS-232 return from a controlled device and send it to the transmitter via a proprietary optical signal.
- Output a daisy-chained signal to another receiver.

If either RS-232 return or daisy-chained communications are implemented, the receiver outputs a proprietary signal on the second fiber optic cable carrying the signal.

For video resolutions up to 1600 x 1200, 1080p, or 1920 x 1200, the video output of the receiver is a perfect, pixel-for-pixel recreation of the video signal input to the transmitter.

With the appropriate adapter, the single link of HDMI video output by the receiver can be converted to DVI-D video.

The receiver has built-in alternating pixels, color bars, and grayscale test patterns to assist in setting up the display equipment.

Transmitter and receiver

The transmitter and receiver have many controls, including image and audio adjustments, and available under RS-232 Simple Instruction Set (SIS™) control. Both units have image, audio, and fiber light status and lost-light alarm indicators.

System Compatibility

The PowerCage FOX Tx HDMI **transmitter** operates in either of two modes, selected under RS-232 control, for compatibility with other, non-HDMI, units:

- **Plus** — Supports resolutions up to 1920 x 1200 @ 60Hz. The fiber optic output of the transmitter can be received only by one of four receivers: a PowerCage HDMI Rx, a PowerCage FOX DVI Plus Rx, a FOXBOX HDMI Rx, or a FOXBOX DVI Plus Rx.
- **Non-plus** — Supports resolutions up to 1600 x 1200 @ 60 Hz or 1080p. The fiber optic output of the transmitter can be received by any PowerCage FOX, FOXBOX, and FOX 500 VGA, and DVI unit, including the Plus and non-Plus units.

The FOXBOX Rx HDMI **receiver** operates interchangeably with all PowerCage FOX, FOXBOX, and FOX 500 VGA and DVI units, including Plus and non-Plus units.

NOTE:
- Although the receiver can operate with non-HDMI transmitters, the video output is not HDCP-compliant.
- The transmitter and receiver are not compatible with the PowerCage FOX AV, FOX AV, PowerCage FOX 3G HD-SDI, FOX 3G HD-SDI, and FOX 3G DVC models.

Cable Transmission Modes

The transmitter and receiver are further categorized by the type of fiber optic cable, multimode or singlemode, which defines the effective range of transmission:

- **Multimode** — Long distance, up to 2 km (6,560 feet) (depending on the fiber cable)
  - PowerCage FOX Tx HDMI MM
  - PowerCage FOX Rx HDMI MM
- **Singlemode** — Very long distance, up to 30 km (18.75 miles)
  - PowerCage FOX Tx HDMI SM
  - PowerCage FOX Rx HDMI SM

NOTE: The multimode and singlemode units are physically and functionally identical, with the exception of the effective range of transmission. In this guide, any reference applies to either transmission mode unless otherwise specified.

Features

Ultra high performance — Offers pixel-for-pixel HDMI or DVI-D (with an adapter) video transmission, up to 1920 x 1200 at 60 Hz (in plus mode) or 1600 x 1200 at 60 Hz (in non-plus mode).

Video input — The transmitter accepts a single link of HDMI or DVI-D video.

EDID emulation mode (Display Data Channel [DDC]) — The PowerCage FOX Tx HDMI transmitter provides a selector switch for specifying the rate of the incoming digital video signal. EDID emulation mode allows proper operation

Video output — The receiver outputs a single link of HDMI video.

Extron fiber optic product compatibility — Enables ultra-long distance HDMI-to-analog RGB and analog RGB-to-HDMI conversion without the need for extra signal conversion devices.

Compatibility with FOX 500 DA6 distribution amplifier and FOX Matrix Switchers

Analog audio input — The transmitter accepts an unbalanced stereo audio input on a 3.5 mm mini jack.

Analog audio input gain/attenuation — The input audio level can be adjusted within a range of -18 dB (attenuation) to +10 dB (gain) via the RS-232 link.

Analog audio output — The receiver outputs balanced or unbalanced stereo audio on a 3.5 mm, 5-pole captive screw terminal.

Links monitoring — The panels of the transmitters and receivers have indicators for monitoring both fiber optic links.

Loss-of-light alarms — The rear panels of the transmitters and receivers have discrete outputs that indicate if either of the fiber optic links has suffered a loss of the light signal.

FOX Extenders Control Program — For RS-232 remote control from a PC running Windows®, the Extron FOX Extenders control software provides a graphical interface and drag-and-drop, point-and-click operation.

Simple Instruction Set (SIS) — The transmitter and receiver use the SIS for easy remote control operation.

Audio level — The audio output can be set to either the consumer level (-10 dBV) or professional level (+4 dBu) under RS-232 control.

Upgradable firmware — The firmware that controls the operation of each unit can be upgraded in the field via the Configuration port on the PowerCage enclosure without taking the unit out of service. Firmware upgrades are available for download on the Extron website, **www.extron.com**, and they can be installed using the FOX Extenders Control Program.

Memory presets — 30 memory presets let you store input size and position settings relative to a specific input resolution. You can then recall those settings, when needed, using the SIS or the control software.

PowerCage mounting — All PowerCage FOX Tx and Rx units are mountable in any Extron PowerCage enclosure.

LockIt™ HDMI Cable Lacing Bracket — Each transmitter and receiver includes a LockIt bracket to secure the HDMI cable to the unit.

Installation and Operation

This section describes the installation and operation of the PowerCage FOX HDMI, including:

- **Mounting the Units**
- **Rear Panel Connections, Controls, and Indications**
- **Transmitter Side Panel Controls**
- **PowerCage Front Panel Port, Control, and Indicators**
- **Operation**

Mounting the Units

The PowerCage FOX transmitter or receiver must be installed in an Extron PowerCage enclosure (see "**Installing a Board in the Enclosure**" on page 42.)

Rear Panel Connections, Controls, and Indications

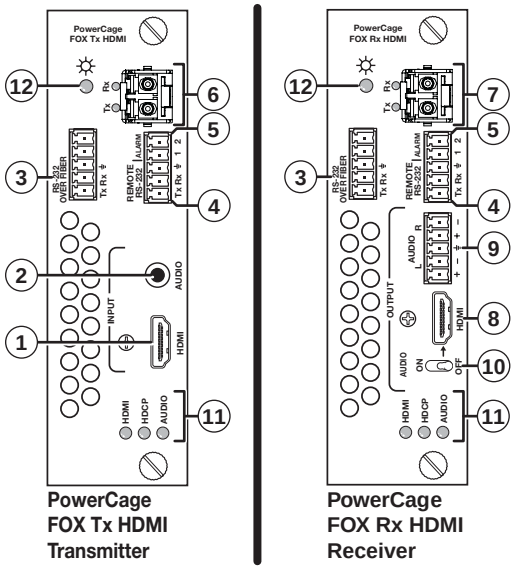


Figure 2. PowerCage FOX Tx Transmitter Connectors, Controls, and Indications

① **HDMI Input connector** — Connect a single link of HMI video to this connector. See "**HDMI connectors**" on page 10 for pin assignments and to use the LockIt HDMI Cable Lacing Bracket to secure the connector to the transmitter.

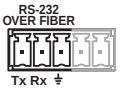
HDMI

② **Audio Input connector** — Connect an unbalanced stereo or mono audio input to this connector.

AUDIO

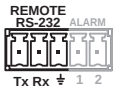
The input audio level can be set via RS-232 control (see "**Audio Adjustment area**" in the "Remote Control" section on page 29.

③ **RS-232 Over Fiber port** — If you want the transmitter and receiver system to pass serial command signals between the transmitter and receiver, for example for serial control of a projector, connect the host device to the transmitter and the slave device to the receiver via the leftmost three poles on the left (Tx, Rx, and ⏚) of the 5-pole captive screw connectors on **both** units (see "**RS-232 connectors**" on page 11 to wire this connector).



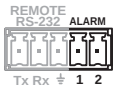
NOTES:
- If you connect only one fiber optic cable (**item** ⑥ on page 8), or you configure the receiver for daisy-chaining, you do not receive reports from the controlled device. To receive responses from the controlled device, you must install two fiber optic cables and leave link 2 enabled (via an **SIS command** to the receiver or using the **FOX Extenders Control Program**).
- The PowerCage FOX Extender can pass RS-232 commands and responses at rates up to 115200 baud.

④ **Remote RS-232 port** — For serial control of the transmitter and receiver, connect a host device, such as a computer, to **either** unit via three poles (Tx, Rx, and ⏚) of this 5-pole captive screw connector on **either** unit (see "**RS-232 connectors**" on page 11 to wire this connector.)



See "**Remote Control**" beginning on page 17 for definitions of the SIS commands (serial commands to control the transmitter via this connector).

⑤ **Alarm outputs port** — For remote monitoring of the status of the Rx fiber optic link, connect a locally-constructed or furnished monitoring device to the unit to be monitored via two poles of this 5-pole captive screw connector on the unit to be monitored. When the unit does not detect light on its Rx connector, pin 1 and pin 2 of this port are shorted together.



⑥ Transmitter fiber optic connectors and LEDs —

WARNING: These units output continuous invisible light, which may be harmful to the eyes; use with caution. For additional safety, plug the attached dust caps into the optical transceivers when the fiber cable is unplugged.

NOTES:

- Ensure that you use the proper fiber cable for your transmitter and receiver pair. Typically, singlemode fiber has a yellow jacket and multimode cable has an orange or aqua jacket.
- Only one fiber optic cable, transmitter-Tx-to-receiver-Rx, is required for video, audio, and serial command transmission. **But**, if you connect only one fiber optic cable, or if your receiver is configured to daisy-chain the optical signal:
  - The HDMI signal output by the receiver **is not** HDCP-compliant.
  - You **do not** receive RS-232 reports from the controlled device.

  To receive responses from the controlled device and for HDCP compliance, you need to install both fiber optic cables and leave link 2 enabled (via an **SIS command** to the receiver or using the **FOX Extenders Control Program**).

⑥a Tx (required) — For all one-way video, audio, and serial communications from the transmitter to the receiver, connect a fiber optic cable to the Tx LC connector.

Connect the free end of this fiber optic cable to the Rx connector (**item** ⑦b on the next page) on the PowerCage FOX Rx HDMI receiver or to any other compatible Extron FOX device.

⑥b Rx (optional) — Connect a fiber optic cable for all one-way return serial communications from the receiver to the transmitter.

Connect the free end of this fiber optic cable to the Tx connector (**item** ⑦a on the next page) on the PowerCage FOX Rx receiver in normal mode or to any other compatible Extron FOX device.

Tx and Rx LEDs — When lit, the link is active (light is received).

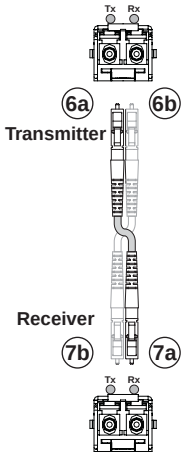


Figure 3. One Way Configuration

⑦ Receiver fiber optic connectors and LEDs —

WARNING: These units output continuous invisible light, which may be harmful to the eyes; use with caution. For additional safety, plug the attached dust caps into the optical transceivers when the fiber cable is unplugged.

NOTES:

- You can connect the transmitter to one or more receivers in one of three ways:
  - **One way (transmitter to receiver) only** — Connect a fiber cable to connector ⑦a from transmitter connector ⑥a **only** (see figure **3**).
  - **Two way (transmitter to receiver and return)** — Connect a fiber cable to connector ⑦a from transmitter connector ⑥a and a fiber cable from connector ⑦b back to the transmitter connector ⑥b (see figure **4**.)
  - **One way (transmitter to receiver) with daisy chain (receiver to receiver)** — Connect a fiber cable from a fiber optic source to connector ⑦a and another cable from connector ⑦b to connector ⑦a on the the next receiver in the daisy chain (see figure **5**.) Set each receiver in the daisy chain to daisy chain mode (via an **SIS command** for the PowerCage FOX Rx receiver.) Up to 10 properly-configured receivers can be connected in a daisy chain to a single transmitter.
- See the transmitter fiber connector **NOTES** on the previous page, which also apply to these connectors.

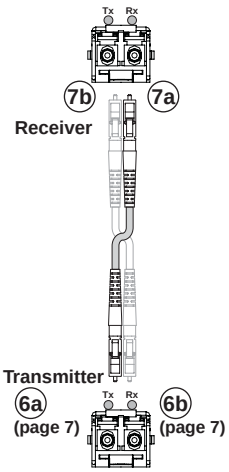


Figure 4. Two Way Configuration

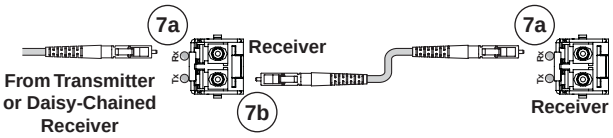


Figure 5. Daisy Chain Configuration

⑦a Rx (required) — For all one-way video, audio, and serial communications from the transmitter to the receiver, connect a fiber optic cable to the Rx LC connector.

Connect the free end of this fiber optic cable to the Tx connector on the PowerCage FOX Tx transmitter (**item** ⑥a on the previous page) or to any other compatible Extron fiber optic device.

⑦b Tx (optional) — Connect a fiber optic cable to the Tx LC connector for either of the following functions:

Normal configuration — For all one-way return serial communications from the receiver to the Rx connector on the transmitter (see figure **5**.)

Daisy chain configuration — For daisy-chained video, audio, and serial communications to the Rx connector on another receiver (see figure **6**.)

NOTE: The Tx connector emits light in either case and the Rx port receives light.

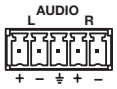
Connect the free end of this fiber optic cable to either:

- The Rx connector on the PowerCage FOX Tx transmitter (**item** ⑥b on the previous page) or to any other compatible Extron fiber optic device
- The Rx connector on another receiver in the daisy chain.

Tx and Rx LEDs — When lit, the link is active (light is received).

⑧ **HDMI output connector** — Connect a video display to this HDMI connector. See "**HDMI connectors**" on the next page for pin assignments and to use the LockIt HDMI Cable Lacing Bracket to secure the connector to the receiver.

⑨ **Audio output connector (receivers)** — This 5-pole, 3.5 mm captive screw connector outputs the transmitted, unamplified, line level audio. Connect audio devices, such as an audio amplifier or powered speakers. See "**Audio output connector**" on page 12 to wire a captive screw connector for the appropriate output type and impedance level.



⑩ **Audio switch** — This switch mutes (Off) and unmutes (On) the embedded audio output on the HDMI output connector. The audio on the captive screw audio output always remains active regardless of the setting of this switch.

⑪ **Signal LEDs** — These indicators light when the transmitter or receiver senses that the associated signal is input (transmitter) or received on the fiber optic cable (receiver).

- **HDMI** — The unit is sensing an HDMI input signal.
- **HDCP** — The input signal is HDCP encrypted.
- **Audio** — The unit is sensing an audio input signal above –35 dBV. The LED turns off if the audio signal level drops below the threshold for 10 seconds.

⑫ **Power LED** — This LED lights to indicate that power is applied to the unit through the PowerCage backplane.

Making Connections

HDMI connectors

Figure **6** defines the pinout for the HDMI protocol.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS data 2+	7	TMDS data 0–	13	CEC control
2	TMDS data 2 shield	8	TMDS data 0 shield	14	Reserved (NC)
3	TMDS data 2-	9	TMDS data 0-	15	SCL
4	TMDS data 1+	10	TMDS clock+	16	SDA
5	TMDS data 1 shield	11	TMDS clock shield	17	DDC / CEC Ground
6	TMDS data 1-	12	TMDS clock-	18	+5 V power
				19	Hot plug detect

Figure 6. HDMI Connector

HDMI signals run at a very high frequency and are especially prone to errors caused by bad video connections, too many adapters, or excessive cable length. To avoid the loss of an image or jitter, follow these guidelines:

- Do not exceed 16.4 feet (5 meters) on the input of the PowerCage FOX HDMI transmitter or the output of the PowerCage FOX HDMI receiver.
- Use only the cable designed for HDMI signals that is supplied by Extron.
- Limit or avoid the use of adapters.
- Use only cables specifically intended for HDMI or DVI signals. Use of non-HDMI or non-DVI cables or modified cables can result in a missing video output.

To securely fasten an HDMI cable to a device:

1. Plug the HDMI cable into the panel connection (see ① in figure **7**).

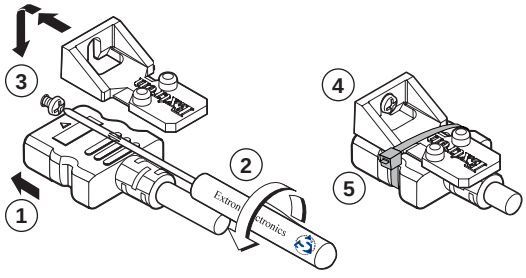


Figure 7. Installing the LockIt Lacing Bracket

2. Loosen the HDMI connection mounting screw from the panel enough to allow the LockIt lacing bracket to be placed over it (②). The screw does not have to be removed.

3. Place the LockIt lacing bracket on the screw and against the HDMI connector, then tighten the screw to secure the bracket (③).

ATTENTION: Do not overtighten the HDMI connector mounting screw. The shield to which it fastens is very thin and can easily be stripped.

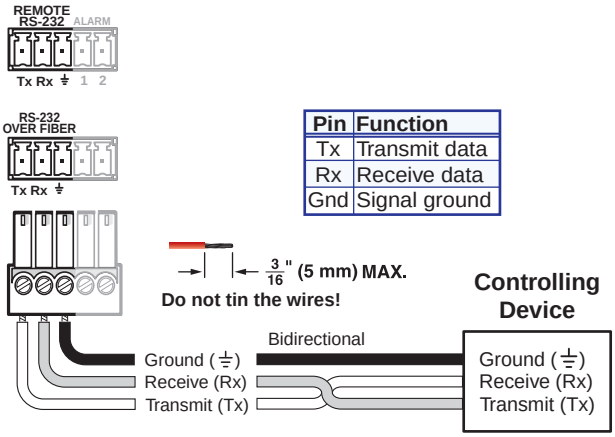
4. Loosely place the included tie wrap around the HDMI connector and the LockIt lacing bracket as shown (④).
5. While holding the connector securely against the lacing bracket, use pliers or a similar tool to tighten the tie wrap, then remove any excess length (⑤).

RS-232 connectors

The RS-232 Over Fiber port is for transmission of serial signals, such as projector control signals, between the transmitter and receiver.

The Remote RS-232 port is for remote control of the transmitter and receiver. The protocol for the Remote RS-232 port is as follows:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits



Pin	Function
Tx	Transmit data
Rx	Receive data
Gnd	Signal ground

NOTE: Cross the Tx and Rx lines once between the source and the target.

Figure 8. RS-232 Over Fiber Connector

NOTE: The length of exposed wires is critical. **The ideal length is 3/16 inch (5 mm)**.

- Longer bare wires can short together.
- Shorter wires are not as secure in the connectors and could be pulled out.

Alarm outputs connectors

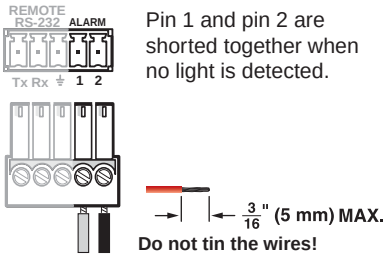


Figure 9. Alarm Connector

NOTE: The length of exposed wires is critical (see the RS-232 connectors **NOTE** on the previous page).

Audio output connector

See figure **10** to properly wire a captive screw output connector. The connector is included with transmitter, but you must supply the audio cable. Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.

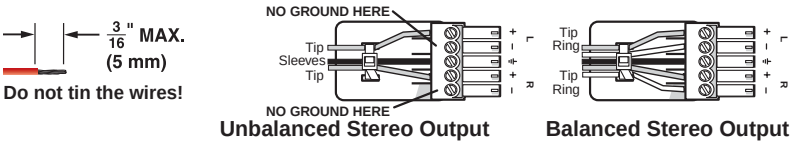


Figure 10. Captive Screw Connector Wiring for Stereo Audio Output

ATTENTION: For unbalanced audio, connect the sleeves to the ground contact. ***DO NOT*** connect the sleeves to the negative (-) contacts.

NOTE: The length of exposed wires is critical (see the RS-232 connectors **NOTE** on the previous page).

Transmitter Side Panel Controls

The following features are on the PowerCage HDMI Tx transmitter, and are accessible though the cut on the left side of the module enclosure (see figure **11**).

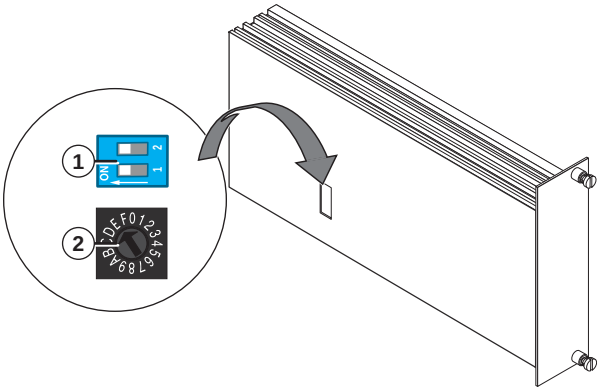


Figure 11. Transmitter Side Panel Controls

① **DIP switches** —

- **Switch 2 (Audio)** — This switch selects which audio input, the audio embedded in the HDMI input or the analog audio, is sent to the receiver. On (left) selects the digital (embedded) audio and off (right) selects the analog audio.
- **Switch 1 (50 Hz or 60 Hz)** — This switch selects the vertical refresh rate of the resolution selected by the EDID Minder hex switch (item ②). On (left) selects the 50 Hz rate and off (right) selects the 60 Hz refresh rate.

② **EDID Minder hex switch** — Set this switch to one of the positions below to select the source of the DDC or a specific resolution.

- **Position 0** — Not applicable
- **Position 1** — The EDID is selected via one of the serial ports in the system using an SIS command or the FOX Extenders Control Program.
- **Position 2 - F** — Specify a resolution. The table below identifies the switch positions and the associated resolutions.

Pos.	Source or resolution	Pos.	Resolution	Pos.	Resolution
0	Not applicable	6	1280 x 800	C	1600 x 1200
1	RS-232	7	1280 x 1024	D	1680 x 1050
2	800 x 600	8	1360 x 768	E	1920 x 1080 (1080p)
3	1024 x 768	9	1366 x 768	F	1920 x 1200
4	1280 x 720 (720p)	A	1400 x 1050		
5	1280 x 768	B	1440 x 900		

PowerCage Front Panel Port, Control, and Indicators

The following features are on the front panel of the PowerCage enclosure (see figure **12**).

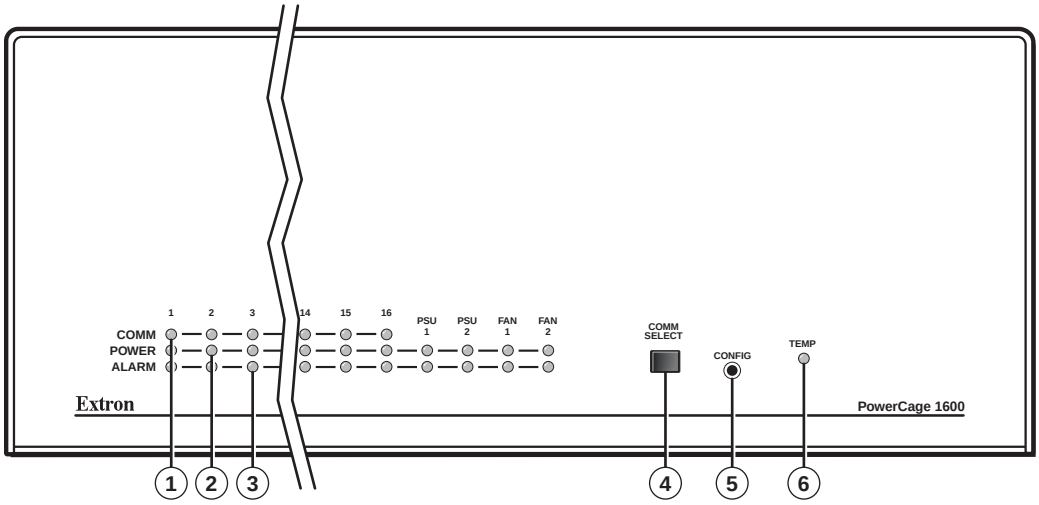


Figure 12. **PowerCage Front Panel Features**

① **Comm LED (16 board locations)** — This LED lights to indicate that the board at this location is selected for connection to the Configuration port (item ⑤). Repeatedly press the Comm Select button (item ④) as necessary to select the desired board.

② **Power LED (all locations)** — This LED lights to indicate that power is applied to the device at this location.

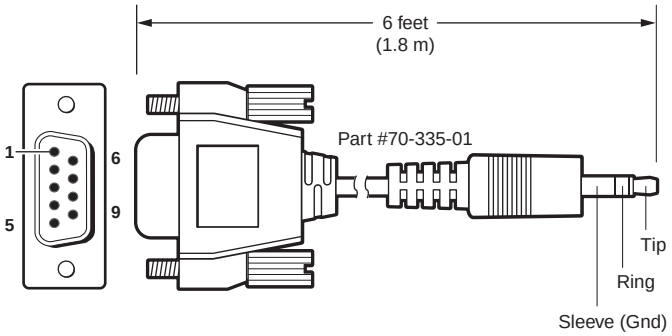
③ **Alarm LED (16 board locations)** — This LED lights to indicate that light is not received on the Rx connector of the board at this location.

Alarm LED (2 PS locations) — This LED lights to indicate that the power supply has failed or is out of tolerance.

Alarm LED (2 Fan locations) — This LED lights to indicate that the fan has failed.

④ **Comm Select button** — Repeatedly press this button as necessary to select the desired board for connection to the Configuration port (item ⑤). The Comm LED (item ①) for the selected board lights.

⑤ **Configuration port** — This 2.5 mm mini stereo jack serves the same serial communications function as the Remote RS-232 port on the transmitter or receiver board, but is easier to access than the ports on the boards after the units have been installed and cabled. The 9-pin D to 2.5 mm mini jack TRS RS-232 cable, included with the PowerCage enclosure, but also available separately, part number **70-335-01** (see figure **13**), can be used for this connection.



9-pin D	Connection	TRS Plug
Pin 2	Rx line on the computer	Tip
Pin 3	Tx line on the computer	Ring
Pin 5	Signal ground on the computer	Sleeve

Figure 13. 9-pin TRS RS-232 Cable

NOTES:
- This port is for remote control of the transmitter or receiver, not for the over fiber RS-232 link.
- This port parallels the Remote RS-232 ports on the boards. If an active front panel configuration connection is made, the Remote RS-232 port on the board becomes inactive.
- The maximum distances from the transmitter or receiver to the controlling device can vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the unit and the controlling device) all affect transmission distance. Distances of approximately 50 feet (15 m) are typically not a problem. In some cases, the unit may be capable of serial communications via RS-232 up to 250 feet (76 m) away.

This port is RS-232 only, with the following protocols:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits

⑥ **Temp LED** — This LED lights to indicate that the temperature within the PowerCage enclosure is dangerously high (above 167 °F [75 °C]) and that equipment damage is imminent.

Operation

After the transmitter, all receivers, and their connected devices are powered up, the system is fully operational. If any problems are encountered, verify that the cables are routed and connected properly, and that all display devices have identical resolutions and refresh rates. If your problems persist, call the Extron S3 Sales & Technical Support Hotline (see the **contact numbers** on the last page of this guide for the Extron office nearest you.)

To take advantage of the various adjustments and test patterns available in the PowerCage FOX, you need to connect a computer or other RS-232 capable device to the Remote/RS-232 port on the unit that provides the function or to the front panel Configuration port and operate using either **SIS commands** or the FOX Extenders **Control Program** on a computer running Windows.

Remote Control

This section describes the remote control operation of the PowerCage FOX HDMI, including:

- **Serial Ports**
- **Simple Instruction Set Control**
- **FOX Extenders Control Program**

Serial Ports

The transmitter and receiver boards each have an RS-232 serial port on a 3 pins of a 5-pin captive screw connector that can be connected to a host device (see **item** ④ on page 6).

The PowerCage enclosure has a Configuration port, a 2.5 mm mini stereo jack, that parallels the board ports (see **item** ⑤ on page 15).

These serial ports make serial control of the transmitter and receiver possible, using devices such as a computer running the Extron DataViewer or MicroSoft HyperTerminal utility or a control system.

The protocol for all ports is as follows:

- 9600 baud
- 1 stop bit
- no parity
- no flow control
- 8 data bits

NOTES:

- For each unit, the Remote RS-232 port is active only if the PowerCage Configuration port is not active. If an active Configuration port connection is made, the Remote RS-232 port for that board becomes inactive.
- RS-232 commands and Windows-based control program functions are transmitter- or receiver-specific or may have different responses depending on the unit connected. You must connect to the appropriate device for the command or function to work properly or to get the expected response.

Simple Instruction Set Control

Host-to-unit Instructions

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command character sequence. When a command is valid, the unit executes the command and sends a response to the host device. All responses from the unit to the host end with a carriage return and a line feed (CR/LF = ↵), which signals the end of the response character string. A string is one or more characters.

Unit-initiated Messages

When a local event, such as an equipment power-up, occurs, the unit responds by sending a message to the host. The unit-initiated messages are listed below:

`(c) Copyright 20nn, Extron Electronics PowerCage FOX Tx HDMI, Vn.nn, 70-889-nn↵↵`

- or -

`(c) Copyright 20nn, Extron Electronics PowerCage FOX Rx HDMI, Vn.nn, 70-889-nn↵↵`

The connected unit issues the appropriate copyright message (above) when it first powers on. V*n.nn* is the firmware version number; 70-889-*nn* is the part number of the connected unit.

`Reconfig↵`

The unit sends the `Reconfig` message whenever the video input signal to the transmitter is changed.

`1Lnknn•2Lnknn•Vidnn•Audnn↵`

The unit sends the status message whenever a change in the fiber link and video and audio connection occurs. *nn* is the link or input status, where 0 = link or input not detected, 1 = link or input detected, and `--` = not applicable for this unit.

`EmbedAudn↵`

The unit sends the Embedded audio message whenever a change in the position of the receiver HDMI Audio switch occurs. *n* is the switch position, where 0 = embedded audio is muted and 1 = unmuted.

Error Responses

When the unit receives a valid SIS command, it executes the command and sends a response to the host device. If the unit is unable to execute the command because the command is invalid or it contains invalid parameters, the unit returns an error response to the host. The error response codes are:

E10 - Invalid command
E11 - Invalid preset number
E13 - Invalid parameter
E14 - Invalid command for this configuration

Using the Command and Response Tables

The command and response tables begin on the next page. Either uppercase or lower case letters are acceptable in the command field except where indicated for the audio level (gain and attenuation) commands. Symbols are used throughout the table to represent variables in the command and response fields. Command and response examples are shown throughout the table. The ASCII to HEX conversion table below is for use with the command and response table.

ASCII to Hex Conversion Table

Space →	20	!	21	"	22	#	23	$	24	%	25	&	26	'	27
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F
Ø	30	1	31	2	32	3	33	4	34	5	35	6	36	7	37
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F
@	40	A	41	B	42	C	43	D	44	E	45	F	46	G	47
H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F
P	50	Q	51	R	52	S	53	T	54	U	55	V	56	W	57
X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F
`	60	a	61	b	62	c	63	d	64	e	65	f	66	g	67
h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F
p	70	q	71	r	72	s	73	t	74	u	75	v	76	w	77
x	78	y	79	z	7A	{	7B	l	7C	}	7D	~	7E	DEL	7F

Esc 1B CR ØD LF ØA

Symbol definitions for transmitter SIS commands

↵ = Carriage return/line feed

← = Carriage return (no line feed)

| = Pipe (can be used interchangeably with the ← character)

• = space

Esc = Escape key

W = Can be used interchangeably with the Esc character

X1 = EDID hex switch position

ØØ = N/A
Ø1 = RS-232 control
Ø2 = 800 x 600
Ø3 = 1024 x 768
Ø4 = 720p*
Ø5 = 1280 x 768
Ø6 = 1280 x 800
Ø7 = 1280 x 1024
Ø8 = 1360 x 768
Ø9 = 1366 x 768
1Ø = 1400 x 1050
11 = 1440 x 900
12 = 1600 x 1200
13 = 1680 x 1050
14 = 1080p*
15 = 1920 x 1200

* 720p and 1080p also include a block for embedded audio; all other positions are video only

X2 = Refresh rate — **1** = 50 Hz, **2** = 60 Hz

X3 = EDID — See the **table** on page 20.

X4 = Native resolution — Resolution and rate in an easily-viewed format, such as "**8ØØx6ØØ@6ØHz**".

X5 = EDID record — 128 or 256 bytes

X6 = Audio gain adjustment range — **ØØ** to **1Ø**

X7 = Audio level adjustment range — **–18** to **+1Ø** (in 1.0 dB steps)

X8 = Audio attenuation adjustment range — **ØØ** to **18**

X9 = Mode switch position and enable or disable status — **Ø** = off (down) or disable, **1** = on (up) or enable

X10 = Link and input status — **Ø** = link or input not detected, **1** = link or input detected

X11 = Internal temperature — *nnn*F•*nn*C

X12 = Transmission mode — **SM** = singlemode, **MM** = multimode

X13 = Firmware version — *v.vv*

X14 = Sync frequency — *xxx.xx* (frequency in kHz [H] or Hz [V])

Command and Response Table for Transmitter SIS Commands

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Switch status			
Request EDID and refresh rate switch positions	Esc Stat ←	EdidMdr X1 •Vrate X2 ↵	
Example:	Esc Stat ←	EdidMdr15•Vrate2↵	EDID switch is set to 15 (1080p) and the vertical rate switch is set to 2 (60 Hz).
Request EDID switch position	Esc 2Stat ←	X1 ↵	
Request Refresh rate switch position	Esc 3Stat ←	X2 ↵	
EDID minder			
NOTES: • The table below the commands defines the value of each EDID value. • The side panel EDID minder rotary switch on the transmitter must be in position 1 for the variables to be changeable via an SIS command. The unit returns the E14 error if the switch is in other than position 1.			
Set EDID resolution and refresh rate	Esc A X3 EDID ←	EdidA X3 ↵	Assign an EDID value of X3.
Example:	Esc A58EDID ←	Edid58↵	Assign an EDID value of 720p at 60 Hz (the default resolution and rate).
View assigned EDID	Esc AEDID ←	X3 ↵	The assigned EDID value is X3.
Show native EDID value	Esc NEDID ←	X4 ↵	Show the native resolution of the display connected to the receiver.
Import EDID	Esc IØEDID ← X5	EdidI↵	

X3	Value	X3	Value	X3	Value	X3	Value	X3	Value
ØØ	User captured EDID								
DVI Pro values (with HDMI-to-DVI adapters)									
Ø1	800x600 @ 50 Hz	Ø7	1280x768 @ 50 Hz	13	1360x768 @ 50 Hz	19	1440x900 @ 50 Hz	25	1680x1050 @ 50 Hz
Ø2	800x600 @ 60 Hz	Ø8	1280x768 @ 60 Hz	14	1360x768 @ 60 Hz	2Ø	1440x900 @ 60 Hz	26	1680x1050 @ 60 Hz
Ø3	1024x768 @ 50 Hz	Ø9	1280x800 @ 50 Hz	15	1366x768 @ 50 Hz	21	1600x900 @ 50 Hz	27	1920x1080 @ 50 Hz
Ø4	1024x768 @ 60 Hz	1Ø	1280x800 @ 60 Hz	16	1366x768 @ 60 Hz	22	1600x900 @ 60 Hz	28	1920x1280 @ 60 Hz
Ø5	1280x720 @ 50 Hz	11	1280x1024 @ 50 Hz	17	1400x1050 @ 50 Hz	23	1600x1200 @ 50 Hz	29	1920x1200 @ 50 Hz
Ø6	1280x720 @ 60 Hz	12	1280x1024 @ 60 Hz	18	1400x1050 @ 60 Hz	24	1600x1200 @ 60 Hz	3Ø	1920x1200 @ 60 Hz
HDMI PC values, all with 2-channel embedded audio									
31	1024x768 @ 50 Hz	36	1280x800 @ 60 Hz	41	1366x768 @ 50 Hz	46	1440x900 @ 60 Hz	51	1680x1050 @ 50 Hz
32	1024x768 @ 60 Hz	37	1280x1024 @ 50 Hz	42	1366x768 @ 60 Hz	47	1600x900 @ 50 Hz	52	1680x1050 @ 60 Hz
33	1280x768 @ 50 Hz	38	1280x1024 @ 60 Hz	43	1400x1050 @ 50 Hz	48	1600x900 @ 60 Hz	53	1920x1200 @ 50 Hz
34	1280x768 @ 60 Hz	39	1360x768 @ 50 Hz	44	1400x1050 @ 60 Hz	49	1600x1200 @ 50 Hz	54	1920x1200 @ 60 Hz
35	1280x800 @ 50 Hz	4Ø	1360x768 @ 60 Hz	45	1440x900 @ 50 Hz	5Ø	1600x1200 @ 60 Hz		
HDMI HDTV values, all with 2-channel embedded audio									
55	480p @ 60 Hz	57	720p @ 50 Hz	59	1080i @ 50 Hz	61	1080p @ 50 Hz		
56	576p @ 50 Hz	**58***	720p @ 60 Hz	6Ø	1080i @ 60 Hz	62	1080p @ 60 Hz		

* Default value

NOTE: X1 = EDID hex switch position
ØØ = N/A; Ø1 = RS-232 control; Ø2 = 800 x 600; Ø3 = 1024 x 768; Ø4 = 1280x720* (720p); Ø5 = 1280 x 768; Ø6 = 1280 x 800; Ø7 = 1280 x 1024; Ø8 = 1360 x 768; Ø9 = 1366 x 768; 1Ø = 1400 x 1050; 11 = 1440 x 900; 12 = 1600 x 1200; 13 = 1680 x 1050; 14 = 1920x1080p* (1080p); 15 = 1920 x 1200
* 720p and 1080p also include a block for embedded audio; all other positions are video only

X2 = Refresh rate — 1 = 50 Hz; 2 = 60 Hz
X3 = EDID — See the table above.
X4 = Native resolution — Resolution and rate in an easily-viewed format, such as "8ØØx6ØØ@6ØHz"
X5 = EDID record — 128 or 256 bytes

Command and Response Table for Transmitter SIS Commands (continued)

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Audio input gain and attenuation			
NOTES: • The set gain (G) and set attenuation (g) commands **are** case sensitive. The increment level, decrement level, and show level **are not** case sensitive. • When the controlling PC is connected to the receiver, the PowerCage FOX can perform this command only if the receiver-Tx-to-transmitter-Rx fiber cable is connected. The unit returns the E14 error if the Rx fiber is not connected.			
Set input audio gain to a +dB value	X6G	AudX7↵	Set the input level to X7 dB (gain).
Example:	2G	Aud+Ø2.Ø↵	Set the input level to +2 dB (gain).
Set input audio attenuation to a -dB value	X8g	AudX7↵	Set the input level to X7 dB (attenuation).
Increment input level	+G	AudX7↵	Increase the audio level by 1 dB.
Example:	+G	Aud+Ø3.Ø↵	Increment the input level from +2 dB to +3 dB.
Decrement input level	–G	Aud–Ø1.Ø↵	Decrease the audio level from 0 dB to –1 dB.
Show input level	G	X7↵	
Plus mode transmission			
NOTE: Plus mode forces the transmitter to emulate a PowerCage FOX DVI Plus or FOXBOX DVI Plus transmitter.			
Enable Plus mode	81*1#	Plus1↵	Turn on Plus mode (default).
Disable Plus mode	81*Ø#	PlusØ↵	Turn off Plus mode.
View Plus mode	81#	X9↵	Show Plus mode status.
Input reports as an HDCP authorized device			
HDCP authorized device on	EscE1HDCP←	HdcpE1↵	Set the transmitter as an HDCP authorized device.
HDCP authorized device off	EscEØHDCP←	HdcpEØ↵	Set the transmitter as **not** an HDCP authorized device.
View HDCP authorized device status	EscEHDCP←	X9↵	Show HDCP authorized device status.
Status requests			
View link 1 (Tx-to-Rx) status	1S	X10↵	
View link 2 (Rx-to-Tx) status	2S	X10↵	
View input video status	3S	X10↵	
View input audio status	4S	X10↵	
View all signal status	5S	SigIX10•SigOX10•HdcpIX10•HdcpOX10↵	Report the status of the HDMI input, HDMI output, HDCP encoding on the input, and HDCP encoding on the output.
View HDMI signal status	6S	SigIX10•SigOX10↵	Report the status of the HDMI input and HDMI output (always -- for a transmitter).
View HDCP status	7S	HdcpIX10•HdcpOX10↵	Report the status of the HDCP encoding on the input and HDCP encoding on the output.
View temperature	2ØS	X11F•X11C↵	Show temperature in degrees Fahrenheit and Celsius.

NOTE:
- X6 = Audio gain adjustment range — ØØ to 1Ø
- X7 = Audio level adjustment range — -18 to +1Ø (in 1.0 dB steps)
- X8 = Audio attenuation adjustment range — ØØ to 18
- X9 = Enable or disable status — Ø = off (down) or disable; 1 = on (up) or enable
- X10 = Link and input status — Ø = link or input not detected; 1 = link or input detected
- X11 = Internal temperature — *nnn*F•*nn*C

Command and Response Table for Transmitter SIS Commands (continued)

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Information requests			
Information request	I	1Lnk[X10]•2Lnk[X10]•Vid[X10]•Aud[X10]•[X12]•Tx↵	The unit responds with the current status (signal detected) of optical link 1, optical link 2, the video input, and the audio link; the fiber optic transmission mode (singlemode or multimode); and the device type (Tx).
Show firmware version	Q	[X13]↵	
Example:	Q	1.23↵	The factory-installed firmware version is 1.23 (sample value only).
Request part number	N	70-889-*nn*↵	See "**Part Numbers**" in the "Reference Information" section on page 40.
Input sync detection	1LS	[X14]horizontal, [X14]vertical↵	Shows horizontal frequency in kHz and vertical frequency in Hz. ØØØ.Ø,ØØØ.Ø if no signal is detected.
Resets			
Reset audio	[Esc]ZA←	Zpa↵	Reset audio setting to default levels (0 dB gain).
System reset	[Esc]ZXXX←	Zpx↵	Reset all settings to factory defaults.

NOTE: [X10] = Link status — Ø = light or signal input not detected — 1 = light or signal detected
[X12] = Transmission mode — SM = singlemode — MM = multimode
[X13] = Firmware version — *v.vv*
[X14] = Sync frequency — *xxx.xx* (frequency in kHz [H] or Hz [V])

Symbol definitions for receiver SIS commands

↵ = Carriage return/line feed

← = Carriage return (no line feed)

| = Pipe (can be used interchangeably with the ← character)

• = space

Esc = Escape key

W = Can be used interchangeably with the Esc character

X9	=	Mute or auto memory status and enable or disable status	Ø = off or disable 1 = on or enable
X10	=	Link and input status	Ø = link or input not detected 1 = link or input detected
X11	=	Internal temperature	*nnn*F•*nn*C
X12	=	Transmission mode	SM = singlemode MM = multimode
X13	=	Firmware version	*v.vv*
X14	=	Sync frequency	*xxx.xx* (frequency in kHz [H] or Hz [V])
X15	=	Horizontal and vertical position	ØØØ through 255
X16	=	Memory preset number	Ø1 through 3Ø
X17	=	Test pattern	Ø = none 1 = color bars 2 = grayscale 3 = alternating pixels
X18	=	Rx link and daisy chain enable	Ø = disable 1 = return link enable 2 = daisy chain enable
X19	=	Video bit depth	Ø = auto 1 = 8-bit
X20	=	Video delay (0 plus six steps at 0.25 seconds per step)	Ø = 0 second 1 = 0.25 second 2 = 0.5 second (default) 3 = 0.75 second 4 = 1.0 second 5 = 1.25 second 6 = 1.5 second
X21	=	Switch position	Ø = off (right) 1 = on (left)

Command and Response Table for Receiver SIS Commands

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Video mute			
Mute output	1B	Blk1↵	Blank the video output.
Unmute output	ØB	BlkØ↵	Output video.
Show video mute status	B	X9↵	Video mute status is X9.
Horizontal shift			
Set a horizontal position	X15H	HphX15↵	Set horizontal centering to X15.
Increment position	+H	HphX15↵	Shift the image one pixel to the right.
Decrement position	–H	HphX15↵	Shift the image one pixel to the left.
Show position	H	X15↵	
Vertical shift			
Set a vertical position	X15/	VphX15↵	Set vertical centering to X15.
Increment position	+/	VphX15↵	Shift the image down one line.
Decrement position	–/	VphX15↵	Shift the image up line.
Show position	/	X15↵	
List sync frequency			
View input frequency	1LS	X14horizontal, X14vertical↵	Shows horizontal frequency in kHz and vertical frequency in Hz. ØØØ.Ø,ØØØ.Ø if no signal is detected.
Memory presets			
Save preset	X16,	SprX16↵	Command code is a comma.
Recall preset	X16.	RprX16↵	Command code is a period.

NOTE:
X9 = Mute and auto memory status — Ø = off, 1 = on
X14 = Horizontal and vertical position — ØØØ through 255
X15 = Sync frequency — *xxx.xx* (frequency in kHz [H] or Hz [V])
X16 = Memory preset number — Ø1 to 3Ø

Command and Response Table for Receiver SIS Commands (continued)

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Auto memory			
Disable auto memory	55*Ø#	ImgØ↵	
Enable auto memory	55*1#	Img1↵	
Show auto memory status	55#	X9↵	
Audio mute			
Mute the audio	1Z	Amt1↵	Silence the audio output of the receiver.
Unmute the audio	ØZ	AmtØ↵	The receiver outputs audio.
Show audio mute status	Z	X9↵	Audio mute status is X9.
Test patterns			
NOTE: You must have a video input connected to the transmitter and the transmitter-Tx-to-receiver-Rx fiber cable connected for the receiver to output a selected test pattern. The test pattern turns off if the input signal rate changes or is disconnected or if power is removed.			
Output color bars	1J	Tst1↵	Set the receiver to output the color bars test pattern.
Output grayscale	2J	Tst2↵	Set the receiver to output the grayscale test pattern.
Output alternating pixels	3J	Tst3↵	Set the receiver to output the alternating pixels test pattern.
Turn test pattern off	ØJ	TstØ↵	Set the receiver to output the input video (no test pattern is selected).
Show test pattern status	J	X17↵	
Disable and enable return link and daisy chain			
NOTE: The disable return link function is primarily used and recommended when the transmitting device is a FOX 500 DA6 and the receiver is connected to any of outputs 2 through 6 on the DA.			
Disable return link	66*Ø*Ø#	Rle*Ø*Ø↵	Disable link 2.
Enable return link to transmitter	66*Ø*1#	Rle*Ø*1↵	Enable link 2 (default setting).
Enable daisy chain	66*Ø*2#	Rle*Ø*2↵	Enable receiver daisy chain mode.
Show return link and daisy chain status	66*Ø#	Ø*X18↵	
Video bit depth			
Set video bit depth to auto	EscVØBITD←	BitdVØ↵	
Force video to 8-bit depth	EscV1BITD←	BitdV1↵	
View video bit depth	EscVBITD←	X19↵	
HDCP notification			
Enable notification	EscN1HDCP←	HdcpN1↵	
Disable notification	EscNØHDCP←	HdcpNØ↵	
View notification status	EscNHDCP←	X9↵	

NOTE:
- X9 = Mute and auto memory status — Ø = off, 1 = on
- X14 = Horizontal and vertical position — ØØØ through 255
- X17 = Test pattern — Ø = none, 1 = color bars, 2 = grayscale, 3 = alternating pixels
- X18 = Rx link and daisy chain enable — Ø = disable, 1 = return link enable, 2 = daisy chain enable
- X19 = Video bit depth — Ø = auto, 1 = 8-bit

Command and Response Table for Receiver SIS Commands (continued)

Command	ASCII Command (Host to Unit)	Response (Unit to Host)	Additional Description
Video shutdown delay			
NOTES: • The Set Video Delay command delays the digital video to help monitors sync correctly during an input rate change. • **Only** video is delayed. Embedded audio is **not** delayed.			
Set delay	3*X20#	DlyX20↵	Delay video by an interval of X20.
Example:	3*3#	Dly3↵	Delay video by an interval of 0.75 seconds (3 x 0.25 seconds).
View delay	3#	X20↵	
Switch and signal status requests			
Request Audio switch status	EscStat←	EmbedAudX21↵	Show the position of the Audio switch: Ø = off (embedded audio is muted) or 1 = on (unmute).
NOTE: The audio on the captive screw audio output always remains active regardless of the setting of this switch.			
Check audio embed	Esc5Stat←	X10↵	Show if audio is embedded in the video stream: Ø = not detected or 1 = detected.
View link 1 (Tx-to-Rx) status	1S	X10↵	
View link 2 (Rx-to-Tx) status	2S	X10↵	
View input video status	3S	X10↵	
View input audio status	4S	X10↵	
View all signal status	5S	SigIX10•SigO•HdcpIX10•HdcpOX10↵	Report the status of the HDMI input, HDMI output, HDCP encoding on the input, and HDCP encoding on the output.
View HDMI signal status	6S	SigIX10•SigO––↵	Report the status of the HDMI input and HDMI output (always - - for a transmitter).
View HDCP status	7S	HdcpIX10•HdcpOX10↵	Report the status of the HDCP encoding on the input and HDCP encoding on the output.
View temperature	20S	X11F•X11C↵	Show temperature in degrees Fahrenheit and Celsius.
Information requests			
Information request	I	1LnkX10•2LnkX10•VidX10•AudX10•X12•Rx↵	The unit responds with the current status (signal detected) of optical link 1, optical link 2, the video input, and the audio link; the fiber optic transmission mode (singlemode or multimode); and the device type (Rx).
Show firmware version	Q	X13↵	
Example:	Q	1.23↵	The factory-installed firmware version is 1.23 (sample value only).
Request part number	N	70-889-*nn*↵	*nn* = 22 (singlemode) or 21 (multimode).
Resets			
Reset memory presets	EscZG←	Zpg↵	Reset (erase) all memory presets.
System reset	EscZXXX←	Zpx↵	Reset all settings to factory defaults.

NOTE:
- X9 = Mute and auto memory status — Ø = off, 1 = on
- X21 = Switch position — Ø = off (right), 1 = on (left)
- X10 = Link status — Ø = light or signal input not detected; 1 = light or signal detected
- X20 = Video delay (0 plus six steps at 0.25 seconds per step) — Ø = 0 second, 1 = 0.25 second, **2 = 0.5 second (default)**, 3 = 0.75 second, 4 = 1.0 second, 5 = 1.25 second, 6 = 1.5 second
- X13 = Firmware version — *v.vv*
- X11 = Internal temperature — *nnn*F•*nn*C

FOX Extenders Control Program

The Extron FOX Extenders program, which communicates with the transmitter and receiver pair, via the Remote RS-232 port of either unit or the PowerCage Configuration port, provides an easy way to operate the pair.

The program is compatible with Windows 2000, Windows XP, Windows 7, or later. Updates to this program can be downloaded from the Extron website (**www.extron.com**).

Installing the Software

The program is contained on a DVD. To install the software, insert the DVD into the drive. The Extron software DVD window should appear automatically. If it does not self-start, run Launch.exe from the DVD. Click the **Software** tab, scroll to the desired program, and click **Install**. Follow the instructions that appear on the screen. By default, the installation creates a `C:\Program Files\Extron\FOX_Extenders` directory, and it places four icons into a group folder named "Extron Electronics\FOX Extender Control Program" The four installed icons are:

- Check for FOX Extenders updates
- FOX Extenders
- FOX Extenders Help
- Uninstall FOX Extenders

Starting the Program

Start the Extron FOX Extenders program as follows:

1. Click **Start** > **Programs** > **Extron Electronics** > **FOX Extenders Control Program** > **FOX Extenders**.

   The Communication Setup window appears (see figure **14**).

Figure 14. Communication Setup Window

2. Select the Com port to which your transmitter or receiver is connected. Click **OK**. The FOX Extenders Control Program window appears (see figure **15**).

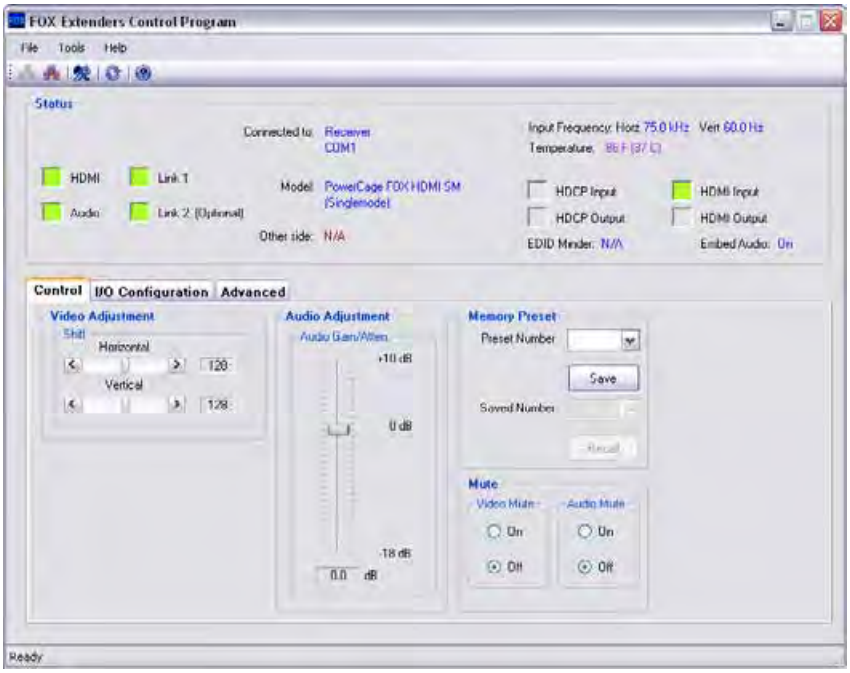


Figure 15. FOX Extenders Control Program Window

NOTES:

- Figure **15** is an amalgam of program displays. Some controls and displays are available when connected to the transmitter **only** and some when connected to the receiver **only**. These functions are identified in the descriptions that follow.
- Only one fiber optic cable, transmitter-Tx-to-receiver-Rx, is required for serial command transmission. But, if you connect only one fiber optic cable, the transmitter does not receive reports from the controlled device. For the transmitter to receive responses from the controlled device, you must install two fiber optic cables and leave link 2 enabled (via an **SIS command** to the receiver or using the **FOX Extenders Control Program**).

Status area

Figure 16. Status Area

The status area provides indications of the connection status.

- **HDMI indicator** — This indicator is green when the transmitter detects a sync signal on its HDMI video input
- **Audio indicator** — This indicator is green when the transmitter detects a low level audio signal for a short period. This indicator goes dark if the audio signal drops below the minimum threshold for a short period.
- **Link 1 indicator** — This indicator is green when the receiver detects light on the fiber optic cable connected to the Tx port.

  NOTE: The receiver detects the transmitter-Tx-to-receiver-Rx light. It reports the status to the transmitter via the optional Rx cable.

  If the PC is connected to the transmitter **and** *either* the secondary (receiver-Tx-to-transmitter-Rx) cable is not connected in your system *or* the receiver is in the daisy chain mode, the Link 1 indicator in the control program does not show green (detected), whether the receiver detects the link or not.

- **Link 2 (Optional) indicator** — This indicator is green when the transmitter detects light on the fiber optic cable connected to the Rx port.

  NOTE: The transmitter detects the receiver-Tx-to-transmitter-Rx light. It reports the status to the receiver via the Tx cable.

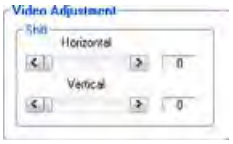
  If the PC is connected to the receiver **and** *either* the primary (transmitter-Tx-to-receiver-Rx) cable is disconnected *or* the receiver is in the daisy chain mode, the Link 2 indicator in the control program does not show green (detected), whether the transmitter detects the link or not.

The Status area also shows to which unit the controlling PC is connected, the FOXBOX model (multimode or singlemode), the internal temperature, and the video input frequency. The Other Side entry cannot be read on the FOXBOX HDMI and shows N/A.

Control tab functions

Click the **Control** tab to access the functions described below.

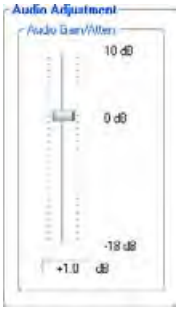
Video Adjustment area



NOTE: The Video Adjustments area controls are available only if your computer is connected to the receiver and an active video input is connected to the transmitter.

The Video Adjustment area provides slider controls that let you change the Shift Horizontal (position) and Shift Vertical (position).

Audio Adjustment area



NOTE: The Audio Adjustment area controls are available only if your computer is connected to the transmitter.

Audio Gain/Attenuation slider — Click and drag the **Audio Gain/Attenuation** slider control to select the input audio gain or attenuation value, from -18 dB to +10 dB in 1.0 dB increments.

Memory Preset area

NOTE: The Memory Preset area controls are available only if your computer is connected to the receiver.

The Memory Preset area provides a means to save and recall memory presets. Memory presets are stored values of the horizontal and vertical position saved in nonvolatile memory. When the PowerCage HDMI unit is powered down and later powered back up, the settings are available for selection using the **Recall** button. Saving the settings to a preset using the **Save** button overwrites the settings previously written to that preset.

Mute area

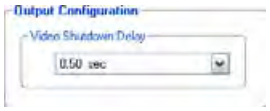
NOTE: The Mute area controls are available only if your computer is connected to the receiver.

Click the **Video Mute On** or **Off** radio button, the **Audio Mute On** or **Off** radio button, or both in the Mute area to turn the video and audio mutes on and off.

I/O Configuration tab functions

Click the **I/O Configuration** tab to access the functions described below.

Output Configuration area



NOTE: The Output Configuration area control is available only if your computer is connected to the receiver.

The Video Shutdown Delay setting delays the digital video to help monitors sync correctly during an input rate change. **Only** video is delayed; embedded audio is **not** delayed.

HDCP area

NOTE:
- The HDCP Authorized controls are available only if your computer is connected to the transmitter.
- The HDCP Notification controls are available only if your computer is connected to the receiver.

Both sets of radio buttons cannot be available for selection at the same time.

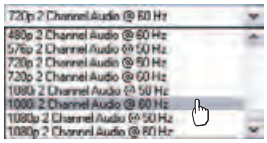
HDCP Authorized radio buttons — The HDCP Authorized setting allows a user to turn off HDCP communication on a discrete input. This setting is useful for devices such as Mac computers, iPhones, iPads, and some Windows 7 sources that always encrypt their output if the downstream sink is capable of HDCP. By not allowing HDCP signals on an input, most content from these sources can be passed as a non-encrypted signal to analog and digital video outputs. In a video system that has requirements to not transmit HDCP encrypted data (such as non-HDMI FOX Extenders), HDCP support should be turned off at the input to keep the non-HDMI output of the FOX Extender unencrypted.

HDCP Notification radio buttons — The HDCP notification function in the receiver enables a connected display to show a green or black screen if the transmitted HDMI video is HDCP encrypted and the display is not HDCP capable.

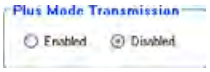
Assigned EDID area

NOTE: The Assigned EDID area control is available only if your computer is connected to the transmitter and EDID Minder hex switch, on the side panel of the transmitter, is in position 1. If the hex switch is not in position 1, the Assigned EDID area advises you "`To change EDID, set rotary switch from #n to #1`."

The Assigned EDID area provides a drop-down box that let you manually set the EDID resolution and refresh rate and reports the position of the EDID Minder hex switch.



Plus Mode Transmission area



NOTE: The Plus Mode Transmission radio buttons are available only if your computer is connected to the transmitter.

The Plus Mode Transmission radio buttons allow you to enable and disable Plus mode.

- **`Enabled`** forces the transmitter to emulate a PowerCage FOX DVI Plus or FOXBOX DVI Plus transmitter for compatibility with one of four receivers: a PowerCage HDMI Rx, a PowerCage FOX DVI Plus Rx, a FOXBOX HDMI Rx, or a FOXBOX DVI Plus Rx.
- **`Disabled`** allows the output of the transmitter to be received by any PowerCage FOX, FOXBOX, and FOX 500 VGA and DVI unit, including the Plus and non-Plus units.

Video Bit Depth area

NOTE: The Video Bit Depth area radio buttons are available only if your computer is connected to the receiver.

The Video Bit Depth radio buttons allow you to force the bit depth to 8 bits or to set it to auto.

Advanced tab functions

Click the **Advanced** tab to access the functions described below.

NOTE: The Advanced functions are available only if your computer is connected to the receiver.

Advanced Configuration area

Link 2 and Daisy Chain radio buttons — Select among the **Enable Link 2**, **Disable Link 2**, and **Enable Daisy Chain** radio buttons to define the function of the receiver Tx LC connector; either:

- Routing RS-232 over fiber to the transmitter
- No function
- Routing the signal received on the Rx LC connector to the next receiver in a daisy chain.

NOTE: The disable return link function is primarily used and recommended when the transmitting device is a FOX 500 DA6 and the receiver is connected to any of outputs 2 through 6 on the DA.

Auto Memory radio buttons — Select the **Auto Memory** radio button to automatically apply saved position settings when the sensed input resolution changes.

Test Patterns drop box — Select one of three built-in test patterns; **Colorbars**, **Grayscale**, and **Alternating Pixels**; as necessary to help adjust the color, brightness and contrast, and focus of the display. Select **Off** to output the video that is input to the transmitter.

NOTES:

- You must have a video input connected, the transmitter-Tx-to-receiver-Rx fiber cable connected, and the receiver cannot be in daisy-chain mode for the receiver to output a selected test pattern.
- The test pattern turns off if the input signal rate is changed or disconnected or if power is removed.

Firmware Upgrade

Firmware can be upgraded for each unit via the PowerCage front panel Configuration port using the Extron Firmware Loader utility from the Windows-based control program.

Downloading the firmware from the Web site

To obtain the latest version of firmware for your PowerCage FOX unit:

1. Visit the Extron website, **www.extron.com**, click the **Download** tab, and then click the **Firmware** link on the left sidebar menu (see figure **17**).

Figure 17. Location of Firmware Upgrade Files

2. On the Download Center screen (see figure **18**), click the links for the appropriate firmware file or files.

> **NOTE:** There are different files for the transmitter (Tx) and receiver (Rx).

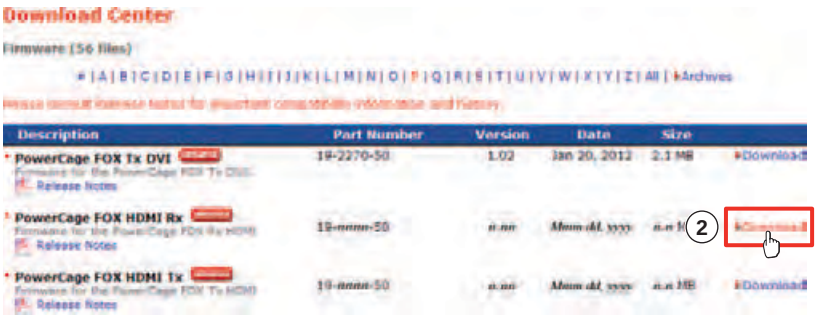


Figure 18. Finding PowerCage FOX Firmware

3. Complete the Personal Information form (see figure **19**) and click the **Download** button.

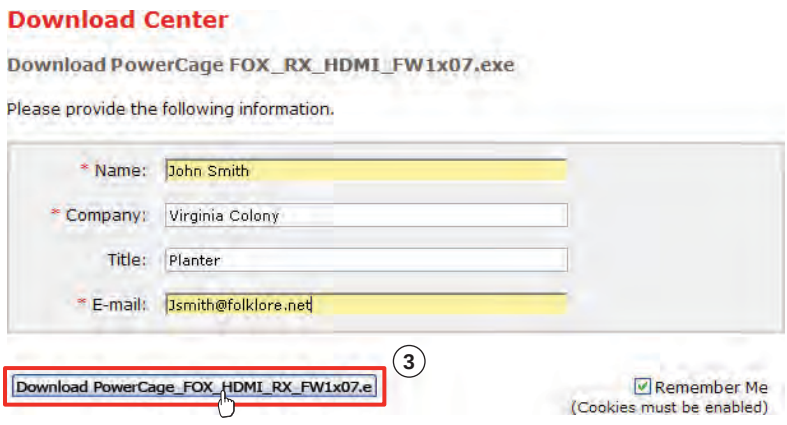


Figure 19. Personal Information Form

> **TIP:** Select the **Remember Me** checkbox to avoid filling out this form in the future.

4. Follow the instructions on the rest of the download screens to download the firmware update from the Extron website, start the Extron Installation Program to extract the firmware file, and place the file in a folder identified in the program window.

NOTE: Note the folder to which the firmware file is saved (see figure **20**).

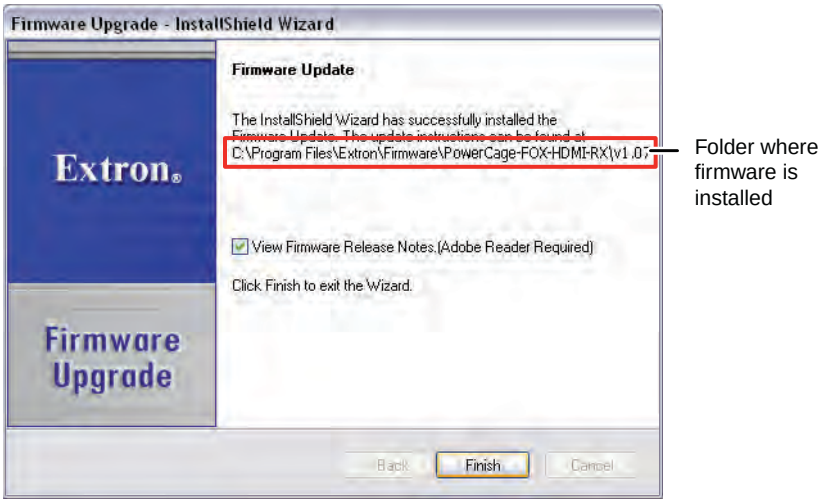


Figure 20. Location of the Firmware File

Loading the firmware to the transmitter and receiver

To load a new version of firmware to your transmitter and receiver, call the Firmware Loader software from within the FOX Extenders Control Program. The serial port on your computer **must** be connected to the PowerCage front panel Configuration port and the unit to be updated must be selected (see **item** ④ and **item** ⑤ in the "PowerCage Front Panel Port, Control, and Indicators" section on page 14).

1. In the FOX Extenders Control Program, click the Firmware Loader button ( ) on the tool bar.

NOTE: If the Firmware Loader button does not appear on the tool bar, the Firmware Loader software is not installed. Install it as follows:

- **a.** On the Extron website, click the **Download** tab.
- **b.** On the Download Center page, click **Software** on the left sidebar menu.
- **c.** Locate the "Firmware Loader" line and click the **Download** link at the far right.
- **d.** Follow the instructions on the download screens to save the installer file to your computer.
- **e.** In Windows Explorer or another file browser, locate the Firmware Loader executable file in the file system on your computer and double-click it to open it.
- **f.** Follow the instructions on the Installation Wizard screens to install the Firmware Loader on your computer. Unless you specify otherwise, the installer program places the Firmware Loader file, "FWLoader.exe" in `C:\Program Files\Extron\FWLoader`.

  If the Extron and FWLoader folders do not yet exist in your Program Files folder, the installer creates them.

2. If you have not previously updated firmware for the PowerCage FOX unit before, on the Add Device screen (see figure **21**), select the **RS-232** tab.

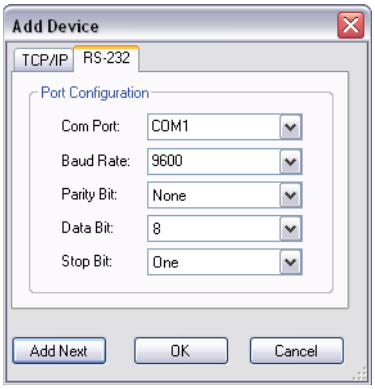


Figure 21. Add Device Screen

If you have previously updated firmware for this model, click **Cancel**. The Firmware Loader window appears. Proceed to step **5**.

NOTE: Although the screen also has a TCP/IP tab, the PowerCage FOX unit does not have a LAN port. Do not select the TCP/IP tab.

3. From the drop-down menus on the RS-232 screen, select the appropriate Com port number and baud rate (the default is 9600).
4. Click **OK**. The Firmware Loader window appears (see figure **22**).

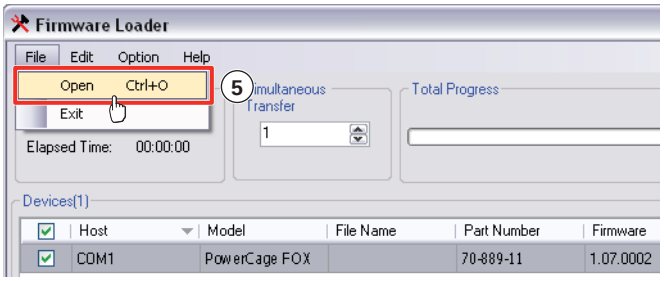


Figure 22. Extron Firmware Loader Window

5. Select the PowerCage FOX unit and click **File** > **Open**. The Choose Firmware File screen appears (see figure **23**).

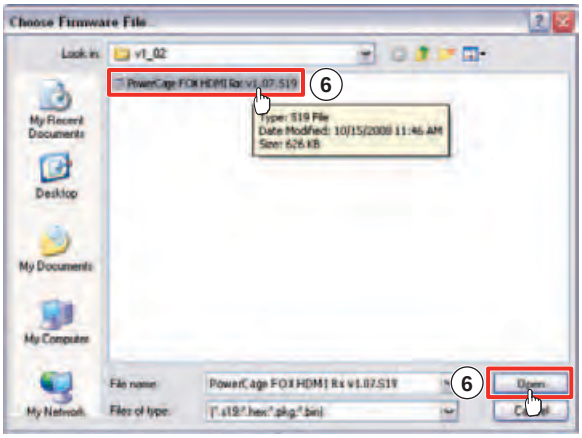


Figure 23. Choose Firmware File Window

6. Navigate to and select the new firmware file. Click **Open**. The Choose Firmware File window closes.

> **NOTE:** When downloaded from the Extron Web site, the firmware is placed in a subfolder of `C:\Program Files\Extron\Firmware`.

> **ATTENTION:** The firmware file must have a .S19 extension. Other file types can cause the unit to stop functioning.

7. In the Firmware Loader window, click **Begin** (see figure **24**).

   The Total Progress and Progress status bars show the progress of the upload. The firmware upload to the unit may take several minutes. Once the status bars have progressed from **0%** to **100%**, and Status is listed as **Completed**, the firmware loader utility resets the unit.

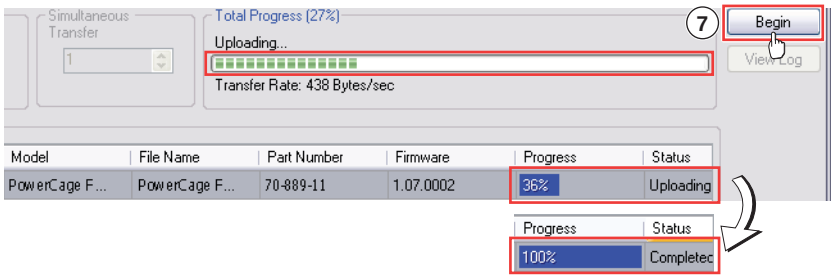


Figure 24. Firmware Loader Screen

8. Click **Exit** to close the Firmware Loader.

Reference Information

This section provides the specifications, part numbers, and installation instructions for the PowerCage FOX HDMI.

Specifications

NOTES:
- The PowerCage FOX HDMI boards are not compatible with the FOX 3G HD-SDI, FOX 3G DVC, or FOX AV models.
- The PowerCage FOX boards are available in singlemode or multimode versions.
- The optional PowerCage FOX boards are class 1 laser products. They meet the safety regulations of IEC-60825, FDA 21 CFR 1040.10, and FDA 21 CFR 1040.11.

Optical specifications — PowerCage FOX boards, interconnection between transmitter and receiver

Number/type ..... 1 singlemode or 1 multimode fiber optic input and output per FOX board, up to 8 double space boards per PowerCage enclosure

NOTE: Only one fiber is required to transmit video, audio, and unidirectional data. A second fiber is required to transmit HDMI video with HDCP content or return data for bidirectional control/communication.

Connectors ..... 2 bidirectional LC connectors per FOX board

Operating distance

Singlemode ..... 30 km (18.75 miles) with singlemode (SM) cables with a SM board

Multimode..... 300 m (985') with 62.5 µm OM1 multimode (MM) cable and a MM board
1 km (3280') with 50 µm OM2 multimode (MM) cable and a MM board
2 km (6561') with 50 µm OM3/OM4 2000 MHz bandwidth laser optimized MM cable and a MM board

NOTE: Operating distance is approximate. These are typical distances. The maximum distance may be greater than these typical numbers depending on factors such as fiber type, fiber bandwidth, connector splicing, losses, modal or chromatic dispersion, environmental factors, and kinks.

Nominal peak wavelength..... 850 nm for multimode (MM), 1310 nm for singlemode (SM)

Transmission power, singlemode or multimode
-5 dBm, typical

Maximum receiver sensitivity

Singlemode ..... -18 dBm, typical

Multimode..... -12 dBm, typical

Optical loss budget

Singlemode	13 dB, maximum
Multimode	7 dB, maximum
Maximum channel data rate	4.25 Gbps

Video — PowerCage FOX Tx/Rx HDMI

NOTE: Appropriate HDMI to DVI-D cables or adapters are required for DVI signal input and output.

Maximum data rate	4.25 Gbps
Maximum pixel clock	165 MHz
Maximum resolution	1920x1200 or 1080p @ 60 Hz, 8-bit color
Formats	RGB, YCbCr, xvYCC digital video
Standards	DVI 1.0, HDMI, HDCP 1.1, CEA-861E

Video input — PowerCage FOX Tx HDMI

Number/signal type	1 single link HDMI
Connectors	1 female 19-pin HDMI type A

Video output — PowerCage FOX Rx HDMI

Number/signal type	1 single link HDMI
Connectors	1 female 19-pin HDMI type A

Audio

NOTE: In PowerCage FOX boards, the analog audio signals are digitized in the transmitter, sent through the fiber cable, and converted back to analog audio in the receiver.

Gain

Range	Adjustable, -18 dB to +10 dB
Default	Unbalanced output: -6 dB; balanced output (default): 0 dB
Frequency response	20 Hz to 20 kHz, ±0.5 dB
THD + Noise	0.10% @ 1 kHz at nominal level
S/N	>80 dB at maximum output (unweighted)
CMRR	65 dB @ 20 Hz to 20 kHz
Audio bits per sample	18 bits per channel, 2 channels (L, R)
Sampling rate	48 kHz

Audio input — PowerCage FOX Tx HDMI

Number/signal type	1 stereo, unbalanced *or* 2 mono, unbalanced
Connector	(1) 3.5 mm mini stereo jack
Impedance	≥10k ohms unbalanced, ≥20k ohms balanced
Nominal level	-10 dBV (316 mVrms)
Maximum level	+8.9 dBV, unbalanced at 1% THD+N

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu.

Audio output — PowerCage FOX Rx HDMI

Number/signal type	1 stereo, balanced/unbalanced *or* 2 mono, balanced/unbalanced
Connectors	(1) 3.5 mm captive screw connector, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Nominal level	-10 dBV (316 mVrms)
Maximum level (Hi-Z)	>+11.0 dBu, balanced at 1% THD+N
Maximum level (600 ohm)	>+10.0 dBu, balanced at 1% THD+N
Audio delay	1.5 frames

Control/remote

Serial control ports	
Enclosure	1 bidirectional RS-232, 2.5 mm mini stereo jack (front panel)
PowerCage FOX boards	
Control	1 bidirectional RS-232, 3.5 mm captive screw connector, 5 pole (uses 3 poles; shared with the alarm port)
Pass-through	1 RS-232, 3.5 mm captive screw connector, 5 pole (3 pins are used, "RS-232 Over Fiber")
Baud rate and protocol	
PowerCage FOX boards	
Control	9600 baud, 8 data bits, 1 stop bit, no parity
Pass-through	9600 to 115,200 baud
Serial control pin configurations	
Captive screw connector	1 = Tx, 2 = Rx, 3 = GND
Mini stereo jack	RS-232: tip = Tx, ring = Rx, sleeve = GND
Program control	Extron control/configuration program for Windows Extron Simple Instruction Set (SIS)

General

Power supply	Internal, 1 or 2* (positive-negative), primary and redundant, hot-swappable 100-240 VAC, 50-60 Hz *A redundant power supply is optional.
Power consumption	
System	Enclosure without boards: 12.4 watts
Individual FOX boards	FOX Tx HDMI: 6.02 watts FOX Rx HDMI: 6.02 watts
Power input requirements for boards	12 VDC, 1.0 A, supplied by the PowerCage enclosure
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Enclosure: fans, front to back Boards: convection, within the PowerCage enclosure
Thermal dissipation	27.6 BTU/hr
Mounting — PowerCage enclosure	
Rack mount	Yes
Enclosure type	Metal
Enclosure dimensions	
PowerCage enclosure	5.25" H x 17.0" W x 12.25" D (3U high, full rack wide) 13.3 cm H x 43.2 cm W x 31.2 cm D (Depth excludes connectors on the optional boards. Width excludes rack ears.)
PowerCage FOX boards	Each fits a double slot opening in a PowerCage enclosure.
Product weight	
PowerCage enclosure	11.6 lbs (5.3 kg)
PowerCage FOX boards	1.1 lbs (0.5 kg)
Shipping weight	
PowerCage enclosure	13 lbs (6 kg)
Boards	2 lbs (1 kg) each
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, FDA Class 1, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Environmental	Complies with the appropriate requirements of RoHS, WEEE.
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTES:
- All nominal levels are at ±10%.
- Specifications are subject to change without notice.

Part Numbers

PowerCage FOX Part Numbers

The PowerCage FOX units must be installed in a PowerCage 1600 enclosure. The units are available in singlemode (SM) and multimode (MM) models:

PowerCage Enclosure and Boards	Part Number
PowerCage 1600 Enclosure	60-978-01

PowerCage FOX Tx HDMI SM	70-889-12
PowerCage FOX Tx HDMI MM	70-889-11

PowerCage FOX Rx HDMI SM	70-889-22
PowerCage FOX Rx HDMI MM	70-889-21

Included Parts

These items are included in each order for a PowerCage FOX Tx HDMI:

Included Parts	Part Number
Tweeker (small screwdriver)	
PowerCage FOX HDMI Tx/Rx Setup Guide	
Captive screw 5-pole connectors (qty. 2)	10-703-12
LockIt Lacing Bracket and tie-wrap	21-235-01
Extron Software Products DVD (FOX Extenders Control Program)	

These items are included in each order for a PowerCage FOX Rx HDMI:

Included Parts	Part Number
Tweeker (small screwdriver)	
PowerCage FOX HDMI Tx/Rx Setup Guide	
Captive screw 5-pole connectors (qty. 3)	10-703-12
LockIt Lacing Bracket and tie-wrap	21-235-01
Extron Software Products DVD (FOX Extenders Control Program)	

Cables

HDMI and DVI cable assemblies

Accessory	Part Number
HDMI M-M Pro Series HDMI male to male cable	26-650-*nn*
HDMI M-DVI-D M/6 HDMI male to DVI-D male, 6' (1.8 m)	26-614-02
DVID SL Pro Series DVI-D male-to-male cable	26-649-*nn*

Fiber cable assemblies

MHR Mini High Resolution Cable	Part Number
4LC MM LC to LC Multimode Fiber Optic Cable Assemblies	26-652-*nn*
2LC OM4 MM P LC to LC Laser-Optimized Multimode Fiber Optic Cable Assemblies — Plenum	26-671-*nn*
2LC SM P LC to LC Bend-Insensitive Singlemode Fiber Optic Cable Assemblies — Plenum	26-670-*nn*

Bulk fiber cable and termination tools

RG6 Super High Resolution Cable	Part Number
OM4 MM P/2K Plenum 2 km (6,562 foot) Spool	22-225-02
SM P/2K Plenum 2 km (6,562 foot) Spool	22-223-02
Fiber Optic Termination Kit Termination Kit	100-656-01
QLC MM/10 Multimode, qty. 10	101-018-01
QLC SM/10 Singlemode, qty. 10	101-017-01

Adapters

Accessories	Part Number
HDMIF-DVIDM HDMI female to DVI-D male adapter	26-616-01
HDMIM-DVIDF HDMI male to DVI-D female adapter	26-617-01

Installing a Board in the Enclosure

Up to 16 single slot or 8 dual slot input/output boards can be inserted into the PowerCage enclosure. The PowerCage transmitters and receivers are all dual slot boards.

NOTE: The boards are hot-swappable, and can be installed or removed without disconnecting power to the PowerCage enclosure.

Use ESD precautions when installing a board to avoid damaging the board. Keep the board in the anti-static bag until needed. Use proper grounding techniques during installation.

1. Ensure power is removed from the PowerCage enclosure.
2. Position the board in the slot so that the power and communication ports on the front end of the board are aligned with the matching ports inside of the board cage (see figure **25**).

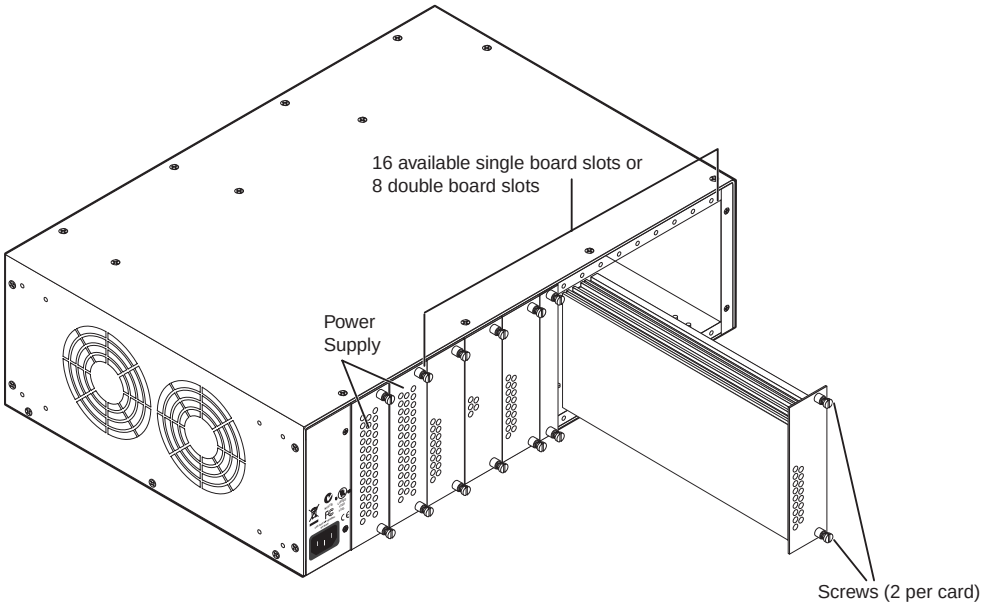


Figure 25. Inserting Boards into the PowerCage 1600 Enclosure

3. Carefully slide the board into the slot and push the board firmly into place.
4. Use a screwdriver to tighten the two screws to secure the board in place.
5. Repeat steps **2** to **4** for all boards needing installation.

NOTE: Ensure the boards are flush with the rear of the enclosure and the screws tightened securely before applying power.

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe and Africa:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: 714.491.1500 or 800.633.9876
Europe: 31.33.453.4040
Asia: 65.6383.4400
Japan: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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Extron Korea
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